TATUNG VGA

OPERATION MANUAL

TATUNG®

FCC Notice

FCC ID: D2A62LTJWBJC Certified to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J, Part 15 of FCC Rules. See instructions below if interference to Radio or Television reception is suspected.

Radio and Television Interference

The equipment described in this manual generates radio-frequency energy. If it is not installed and used properly it may cause interference with radio and television reception. The monitor you purchase must also comply with the limits for Class B computing devices in accordance with the specifications in Subpart J, Part 15, of FCC rules. These rules are designed to provide reasonable protection against such interference in a residential installation.

The cable connection between the computer and the monitor must be a shielded cable with the shield properly grounded. There is no guarantee that interference will not occure in a particular installation, especially if a telescoping-rod type antenna is used. You can determine if your equipment is the cause of interference by turning it off. If the interference stops, it was probably caused by the computer or the monitor. To correct the problem try:

1. Turning the TV or radio antenna until the interference stops.
2. Moving the computer further away from the TV or radio.
3. Moving the computer from one side of the TV or radio to the other.
4. Plugging the computer into an outlet on a different circuit breaker or fuse than the TV or Radio.
5. Installing a rooftop antenna connected to your TV and radio with coaxial cable.
6. Identifying the offending piece of hardware (e.g., monitor or computer) by selectively turning them off one at a time an checking for interference.

If necessary, you should consult your computer dealer for additional suggestions. You may find the booklet How to Identify and Resolve Radio-TV Interference Problems prepared by the Federal Communications Commission helpful. This booklet is available from the U.S. Government Printing Office, Washington, DC 20402. Refer to Stock Number: 004-000-00345-4.

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Patent Pending

USER'S GUIDE

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PART 1: INSTALLATION

WHAT YOU NEED

- ❑ Computer 100% compatible with IBM PC/XT/AT or PS/2 Model 30
- ❑ Open 8-bit or 16-bit System Expansion Slot
- ❑ MS-DOS or PC-DOS operating system, version 2.0 or later (for installation software)
- ❑ Medium Flat Blade Screwdriver

ABOUT THIS MANUAL

This manual is designed so you can get your new VGA Adapter installed and running fast . . . whether you are new to computers or an "old pro."

Symbols and Conventions

Symbols in this manual have these special meanings:

- ✻ indicates a **WARNING** or other very important information
- ☞ draws your attention to **NOTES** *which may be further emphasized by being in italics*
- ✓ is followed by a **REMINDER**; something that has been covered before or that you probably know but need to be sure to remember

DOS Commands

Instructions for entering DOS commands are shown in typewriter style with special keys (e.g. ENTER) shown in brackets:

```
INSTALL [ENTER]
```

Overviews

Many sections in this guide begin with an overview that looks like this:

OVERVIEW
☐ Each major section begins with a box which provides an overview of the information which follows

Most Up-to-Date Information

Before you begin installation, place the VGA Adapter Utility Diskette in Drive A and type:

```
README [ENTER]
```

This gives you information available after this manual was published.

If you're new to computers:

Use easy-to-follow, complete instructions for each installation step.

If you have some computer experience:

1. See "Quick Start Guide" for overview of installation process.

2. Use the Overview at the beginning of each installation step for essential information pertaining to steps of the installation process.

3. Complete installation, referring to detailed instructions for further clarification and information as needed.

If you're experienced with computers:

1. Use "Quick Start Guide" to complete installation.

2. Refer to overviews and detailed instructions if you need more information about a particular installation step.

3. See appendices for additional technical information as desired.

❇ *Words of Caution . . . Before You Touch*

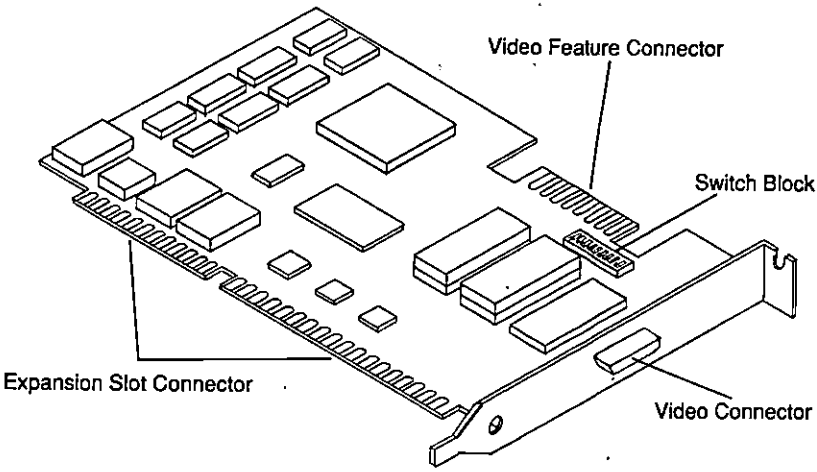
OVERVIEW
❑ Exercise usual precautions to prevent static electric damage to microcircuits

Static can cause severe damage to microcircuits. There are some ways to minimize damage to your VGA Adapter and your computer:

- ❑ Handle the VGA Adapter by the edges only. Don't touch edge connectors or exposed circuitry.
- ❑ Leave the VGA Adapter in the anti-static protective bag until ready to actually install the VGA Adapter in your computer.
- ❑ If possible, ground your body when handling your VGA Adapter. The metal power supply housing is generally considered the best place to ground yourself.
- ❑ Do not wear polyester clothing or have plastic, vinyl, or styrofoam in the areas where you are working.
- ❑ Do not place the VGA Adapter on a metal surface.
- ❑ Make the least possible movement to avoid building up static electricity from your clothing, carpets and furniture.

Parts of the VGA Adapter

This drawing will help you identify the location of switches and connectors on your VGA Adapter board.



QUICK START GUIDE

☞ This is a very lean description of the VGA Adapter installation process. It enables experienced computer users to be "up and running" in minutes!

✓ Check README file for the most recent information.

Step 1 Set the VGA Adapter Switches

☞ Default settings for the VGA Adapter Switches are best in most cases. If you have difficulties, check page 13, *"Setting the VGA Adapter Switches."*

Step 2 Prepare Your Computer

- ❑ Turn off, then unplug computer and external options from electrical connections.
- ❑ Remove cover mounting screws and cover.

Step 3 Configure Your Computer

- ❑ For IBM PC/XTs and compatibles, set DIP Switch SW1, positions 5 and 6 to ON.

- ❑ For IBM ATs and XT Model 286s, slide Display Adapter switch toward the front of your system unit. (Some AT's don't have this switch -- in which case, no action is required.)

Step 4 Install the VGA Adapter in Expansion Slot

- ✻ *Refer to "Appendix A - Two Monitor Systems" if appropriate.*
- ❑ Press the VGA Adapter into any empty full length (16-bit slot is best) expansion slot.
- ❑ Secure the adapter with expansion slot screw.

Step 5 Close Your Computer

- ❑ Slide cover on and secure with cover mounting screws.
- ❑ Connect monitor to 15 pin "D" shaped video connector at the outside rear of the VGA Adapter.
- ❑ Reconnect power to external devices and system unit.
- ☞ Special Instructions:
  - ○ ***For PC AT*** -- Run the menu driven "SETUP" Program to complete the installation.
  - ○ ***For PS/2*** -- Don't use your system video connector; use the VGA Adapter connector.
  - ○ ***For Multisync/Multiscan/Omniscan*** -- Set your monitor for "Analog" operation.
  - ○ ***For Expanded Memory (EMS) Board*** -- Designate exclusions for "A000" through "CA7F" when invoking your EMS driver.

Step 6 Run the VGA Adapter Installation Program

- ❑ Put the VGA Adapter Utility Diskette in Drive and type:

```
INSTALL [ENTER]
```

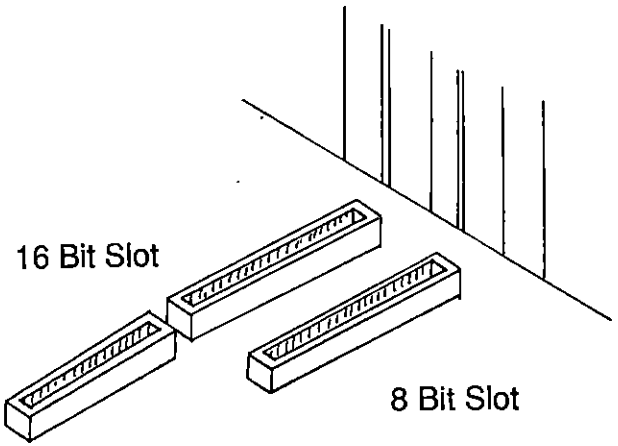
- ❑ Follow the menu instructions to install RAMBIOS Driver and Screen Saver.

✓ ***If you need further information, check the instructions in this guide and "Appendix C - Troubleshooting the VGA Adapter Installation."***

THE VGA ADAPTER'S COMPATIBILITY WITH YOUR COMPUTER

The VGA Adapter can be installed in any full length, 8-bit or 16-bit slot in computers compatible with the IBM PC/XT/AT and PS/2 Model 30.

☞ For significantly faster performance, install your VGA Adapter in a 16-bit slot rather than an 8-bit slot whenever possible.



☞ *If you have an Older IBM PC . . .*

The VGA Adapter is 100% compatible with IBM's standards for VGA. IBM designed the Video Graphics Array to run with the BIOS ROM dated on or after October 27, 1982.

The VGA Adapter will not work with:

- ❑ **IBM PCs with a BIOS dated before October 27, 1982.**
- ❑ **IBM compatible computers with BIOS which is not compatible with IBM's BIOS standards on or after October 27, 1982.**

It's easy to check the date of your computer's BIOS ROM:

Step 1 Boot up your system.

Step 2 Place the VGA Adapter Utility Diskette in Drive A.

Step 3 At the Drive A system prompt, type:

ROMDATE [ENTER]

Step 4 Check BIOS ROM date for your computer displayed on the screen.

a. If the displayed date is prior to October 27, 1982, the VGA Adapter will not work properly.

b. If the displayed date is on or after October 27, 1982, continue with the installation of your the VGA Adapter.

THE VGA ADAPTER'S COMPATIBILITY WITH YOUR MONITOR

The VGA Adapter works properly with monitors compatible with the IBM PS/2 analog displays, models 8503, 8512, 8513 and 8514, or Tatung CM-1496, CM-1492, CM-1296, MM-1433, and MM-1233.

✻ *If you have a Two Monitor System or a System with Built-In Video, See Appendix A.*

THE VGA ADAPTER'S COMPATIBILITY WITH YOUR SOFTWARE

- Extended resolution 800 X 600 graphics mode and 132-column text modes require a variable frequency display such as the NEC MultiSync, Sony Multiscan, or Tatung Omniscan.

- The VGA Adapter is designed to work with software written for these video standards:

  VGA - IBM Video Graphics Array

  EGA - IBM Enhanced Graphics Adapter

  CGA - IBM Color/Graphics Adapter

  MDA - IBM Monochrome Display Adapter

  HGC - Hercules Graphics Card

SETTING THE VGA ADAPTER SWITCHES

The default setting for switches on your VGA Adapter are generally the best option for most systems. Should you have difficulties, you may want to try some different switch settings. This section gives information about switch settings.

Switches 1 through 3

Switches 1 through 3 are reserved for future use, and should be left OFF.

Switch 4
Switch 4 is reserved for future use and *must be left OFF.*

Switch 5

Switch 5 ENABLES/DISABLES your VGA Adapter's capability to provide backwards compatibility emulation. To activate this feature, you will run the VGA.COM program included in your VGA Adapter software.

Switch 5

ON	Allow Emulation	**(Default Setting)**
OFF	Disallow Emulation	

Switches 6 and 7

At start-up, the VGA Adapter detects whether your computer has 16-bit or 8-bit ROM and Memory access. It is possible that some IBM compatible computers will not allow your VGA Adapter's automatic sensing system to work properly. In this case, you may reset Switches 6 and 7 as follows:

Switch 6

ON	Allow 16-bit ROM access	**(Default Setting)**
OFF	Force 8-bit ROM access	

Switch 7

ON	Allow 16-bit Memory access	**(Default Setting)**
OFF	Force 8-bit Memory access	

Switch 8

The VGA Adapter offers extension registers beyond the IBM VGA's standard. Some operating environments are sensitive to the use of these extension registers. If Switch 8 is ON, the VGA BIOS will not access any extension registers after initialization.

Turning Switch 8 ON will also prevent the BIOS from accessing extended modes such as 800 x 600 16-color mode. The VGA Adapter software contains the VGA.COM program which allows you to enable access to these modes even if Switch 8 is ON.

Switch 8

ON	Force Standard VGA Mode
OFF	Allow VGA Adapter extensions **(Default Setting)**

PREPARING YOUR COMPUTER

OVERVIEW	
❑	Turn off, then unplug computer and external options from electrical connections
❑	Unplug external options cables from computer
❑	Remove cover mounting screws and slide cover off

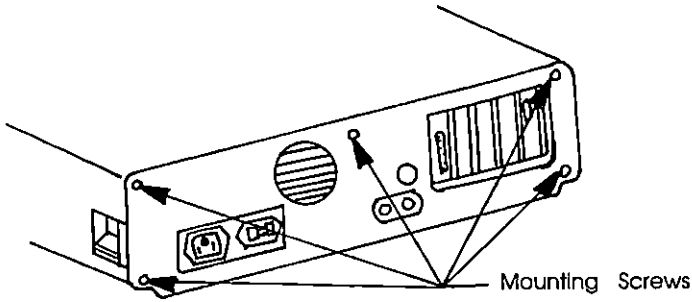
✻ *Drawings and instructions in this manual are of IBM PC/XT/AT and PS/2 Model 30 computers. Most IBM compatible computers look essentially the same. Refer to your system user's guide for further information as needed.*

Step 1 Switch off your computer and all external options (printer, display, and others) and unplug all power cords from electrical source.

Step 2 Note the position of all external options cables connected to the rear of computer and disconnect them.

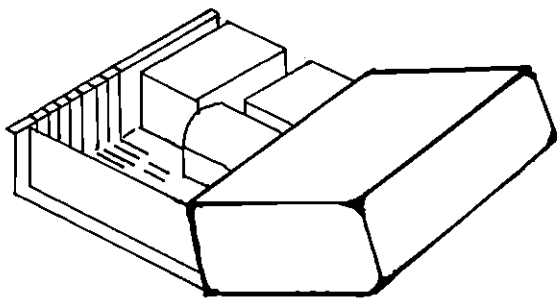
Step 3 Remove the cover-mounting screws and save them for reinstalling the cover.

☞ If the screws are not visible, your system unit may have a protective rear cover panel. It should pull right off. See your system manual to avoid damaging your computer.



☞ ***If your system has a key lock,*** unlock it and remove the key.

Step 4 Facing the front of the computer, hold onto both sides of the system cover. Slide the cover toward you. As the rear edge of the cover reaches the front of the PC, tilt the front of the cover upward, remove it and set it aside.



CONFIGURING YOUR COMPUTER

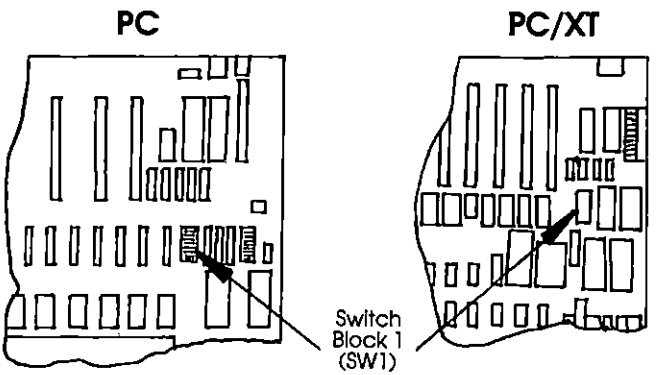
OVERVIEW
❑ For IBM PC/XTs and compatibles, set DIP Switch SW1, positions 5 and 6 to ON
❑ For IBM ATs and XT Model 286s, slide Display Adapter switch toward the front of your system unit

Step 1 Use the drawings/descriptions that follow to help identify the type of computer you have while locating system switches.

☞ *Switches are located on the system board -- the base of the unit into which adapters are plugged -- and the descriptions/drawings are from the perspective of looking toward the back wall of the computer case*

IBM PCs have two switch blocks; one about six inches away from and almost exactly perpendicular to the keyboard connector and the other slightly to the left of the first.

IBM PC/XTs have one switch block about six inches away from and slightly to the left of the keyboard connector.

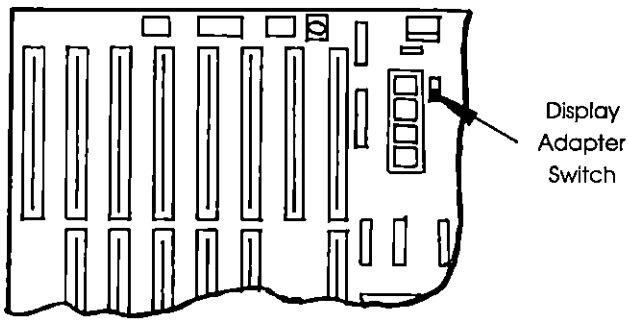


IBM ATs and XT Model 286s have a Display Adapter switch within a couple of inches and slightly to the right of the keyboard connector.

☞ Some early release IBM ATs don't have a Display Adapter switch.

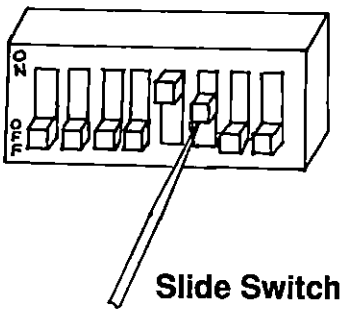
The **IBM PS/2** series does not have this switch.

PC/AT



Front of Computer

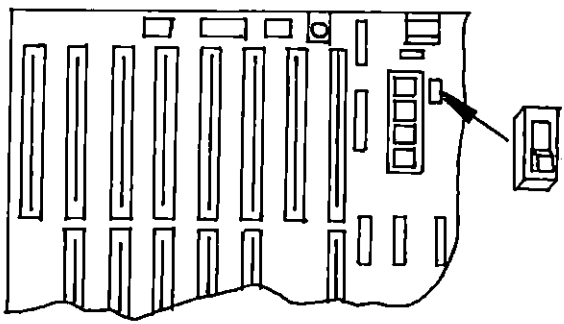
Step 2 A ***For the IBM PC/XT or compatible:***
Set the switch you just located - positions 5 and 6 to ON as shown below:



Step 2 B **For IBM ATs and 286s *or compatibles*:**
Slide the Display Adapter switch so that it is *toward the front* of the computer.

☞ The switch may already be in the forward position if there is/was already some type of color graphics adapter card installed.

PC/AT



Front of Computer

INSTALLING THE VGA ADAPTER CARD IN EXPANSION SLOT

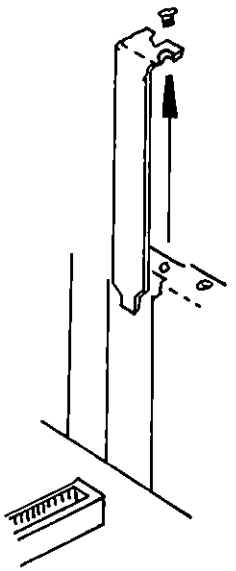
OVERVIEW
❑ Use any empty full length expansion slot
❑ Hold the VGA Adapter board by the edges and align it with the support brackets. Firmly press the VGA Adapter connector board into the expansion slot/socket
❑ Secure the adapter with expansion slot screw

❇ ***Important!***

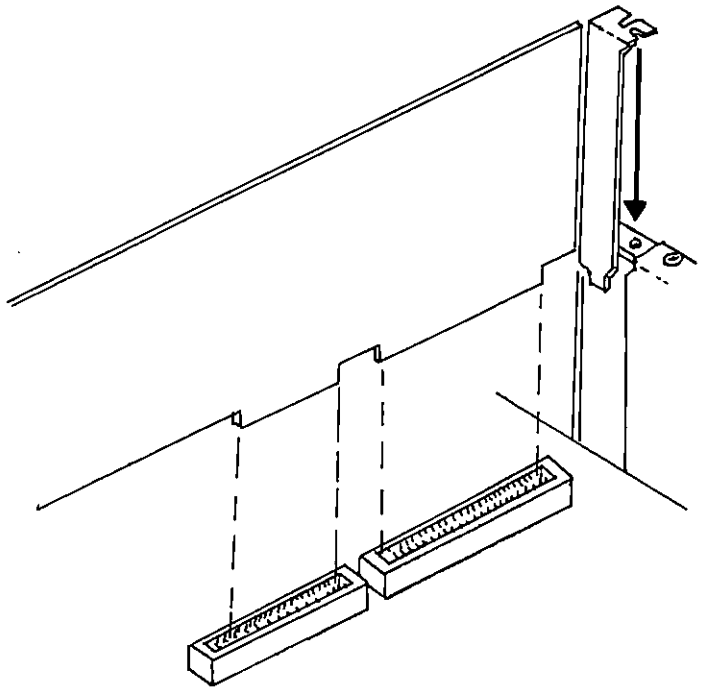
- ❑ Refer to "A Word of Caution" on Page 6 for proper procedures in handling the VGA Adapter board.
- ❑ *Refer to "Appendix A - Two Monitor Systems" if you intend to have more than one video card installed in your system.*

Step 1 The VGA Adapter can be installed in any full-length expansion slot. (Use a 16-bit slot if possible.) If the expansion slot still has the metal expansion slot cover attached, remove it with a screwdriver. Save the screw for installing the VGA Adapter board.

☞ If you just removed an adapter, you can use that slot for installing the VGA Adapter card.



Step 2 Hold the VGA Adapter by the edges, align it with the support brackets, and press the VGA Adapter connector firmly into the expansion slot/socket.



Step 3 Align the slot in the mounting bracket of your VGA Adapter with the screw hole in the rear panel of the computer case.

Use the screw you removed from the expansion slot cover to secure your VGA Adapter in place.

CLOSING YOUR COMPUTER

OVERVIEW
❑ Close System Unit in usual manner
❑ Reconnect external device cables
❑ Reconnect power to external devices and system unit

Before you close your computer, be sure to:

✓ Review all Installation Steps for accurate completion.

✓ Properly set all switches.

Step 1 Secure ribbon cables by gently pushing them down and out of the way before you replace the system cover.

Step 2 Facing the front of the computer, hold onto both sides of the system cover, and slide the cover towards the rear of the system.

Step 3 Align the cover mounting screws with the screw holes at the rear of the computer. Insert and tighten screws.

Step 4 Reconnect all cables that were previously attached to the rear of the computer.

Step 5 Attach your monitor cable to your VGA Adapter's 15-pin video connector.

☞ See "Appendix B - Technical Information" if you want more information on cable connectors.

Special Instructions

- ***For PC/AT owners only:***
  Run your computer's "SETUP" Program to complete the installation. Answer setup questions per your configuration.

  If you have an IBM PC/AT compatible, check your manual to determine what is required for system setup. If there is a special "IBM EGA/VGA" option in the setup menu, choose this option. If your setup menu has options for "IBM EGA," "Other Display" or "No Display," try each setting to determine the proper configuration.

- ***For PS/2 and compatibles owners:***
  Your system monitor is to be connected to 15 pin "D" shaped video connector at the rear of the VGA Adapter rather than the system board connector.

- ***For Multisync/Multiscan/Omniscan owners:***
  Set your monitor for "Analog." If necessary, see your Monitor Owner's Manual or check with your display equipment dealer for further instructions about how to do this.

- ***For Expanded Memory (EMS) Board Owners:***
  The VGA Adapter uses the memory location designated by the IBM standard for EGA cards ("A000" through "CA7F") for the extended video BIOS. EMS boards can conflict with these locations. Check with the manufacturer of your EMS board for information about designating exclusions for these locations when invoking your EMS driver.

About Your Applications Software

Your software must run in the appropriate mode for the text and graphics you choose. To run software in the VGA Adapter's extended mode, support must be provided in the software to allow you to choose the VGA Adapter extended graphics resolution or text modes and colors.

Once your VGA Adapter is installed, see the Application Software section of this manual for details on reconfiguring many software programs to take full advantage of your VGA Adapter's enhanced capabilities (beyond standard VGA) including graphics modes with higher resolution that allow finer detail in drawings and other graphics:

Resolution	Colors	Monitor Timing	
		Vertical	Horizontal
800 x 600	16	56 Hz	35.0 KHz
720 x 540	16	60 Hz	35.0 KHz
752 x 410	16	70 Hz	31.5 KHz
640 x 480	16	60 Hz	31.5 KHz
640 x 400	256	70 Hz	31.5 KHz

INSTALLATION PROGRAM

The VGA Adapter can be used with a hard or a floppy disk drive system. If you have correctly set and installed the VGA Adapter, the DOS prompt will appear on your monitor when you boot up your system. If your system does NOT boot up as you intended, check to see that the installation instructions were properly followed, or refer to *"Appendix C: Troubleshooting the VGA Adapter Installation."*

✻ ***Back up the VGA Adapter Utility Diskette!***
Before using the VGA Adapter Utility Diskette, we strongly recommend that you make a backup copy and store the original in a safe place.

The Installation Program is menu-driven and helps you configure your system for use with the VGA Adapter. To run the Installation Program:

Step 1 Insert the VGA Adapter Utility Diskette in Drive A (or make the Drive with the VGA Adapter INSTALL.COM the current Drive/directory).

Step 2 At the DOS prompt, type:

```
INSTALL [ENTER]
```

Step 3 Follow the menu instructions.

SCREEN SAVER

The VGA Adapter Screen Saver "shuts off" your screen display if no key is pressed on your keyboard within some period of time. This feature is described completely in the section beginning on page 32 of this manual.

The *VGA Adapter Installation Program* modifies or creates an AUTOEXEC.BAT file that will automatically set up the *VGA Adapter Screen Saver* feature when you turn your computer on.

Step 1 Insert the VGA Adapter Utility Diskette in Drive A (or make the Drive with the VGA Adapter INSTALL.COM the current Drive/directory).

Step 2 At the DOS prompt, type:

```
INSTALL [ENTER]
```

Step 3 Choose "Set up the VGA Adapter Screen Saver" from the VGA Adapter Installation Program Menu.

Step 4 Follow the menu instructions.

RAMBIOS DRIVER

RAMBIOS.SYS allows you to install the VGA Adapter BIOS in memory (about 24K memory required) to enable some programs to run faster. Choosing "Install the VGA Adapter RAMBIOS Driver" from the Installation Program menu adds the necessary device driver command in a CONFIG.SYS file.

The Installation Program will create a CONFIG.SYS file if you do not have one, or will modify your existing file.

Step 1 Insert the VGA Adapter Utility Diskette in Drive A (or make the Drive with the VGA Adapter INSTALL.COM the current Drive/directory).

Step 2 At the DOS prompt, type:

```
INSTALL [ENTER]
```

Step 3 Choose "Install the VGA Adapter RAMBIOS Driver" from the VGA Adapter Installation Program Menu.

Step 4 Follow the menu instructions.

Optional Installation from DOS Prompt

With a Hard Disk:

Step 1 Copy the file "RAMBIOS.SYS" from the VGA Adapter Utility Diskette into the root directory on your hard disk.

Step 2 Create/modify your CONFIG.SYS file by adding the following to the first line of the file:

```
DEVICE=C:\RAMBIOS.SYS
```

✓ Refer to your DOS Manual if you need instructions for creating/editing a CONFIG.SYS file.

With a Floppy Drive:

Step 1 Insert the VGA Adapter Utility Diskette in Drive A.

Step 2 Insert your DOS boot-up diskette into Drive B.

Step 3 Copy the file RAMBIOS.SYS from the VGA Adapter Utility Diskette onto your DOS boot-up diskette.

Step 4 Create/modify your CONFIG.SYS file by adding the following to the first line of the file:

```
DEVICE=A:\RAMBIOS.SYS
```

✓ Refer to your DOS Manual if you need instructions for creating/editing a CONFIG.SYS file.

PART 2: UTILITIES

VGA UTILITY MENU

With the VGA Utility Menu, you can:

- Set Screen Saver Options.
- Select Emulation Mode.
- Switch Monitor Type.

It can be used with a hard or a floppy disk drive system. To run the VGA Utility Menu program :

Step 1 Insert the VGA Adapter Utility Diskette in Drive A (or make the Drive with VGA.COM the current Drive/directory).

Step 2 At the DOS prompt, type:

```
VGA [ENTER]
```

Step 3 When the VGA menu appears, select the feature option you want.

Additional menus will appear to guide you through procedures for the configuration you want. More details for each feature option follow.

SCREEN SAVER

Feature Description

VGA Screen Saver can extend the life of your monitor by preventing images from being "burned" into your screen due to long periods of inactivity such as when you are away from your computer.

VGA Screen Saver "shuts off" your screen display if no key is pressed on your keyboard within some period of time. (The default setting for time elapsed without activity is five minutes.) Generally, your screen display is returned by pressing any key on your keyboard. Pressing the "NUMLOCK" key is thought to be one of the best choices because this key usually has little or no effect on a program in progress.

You may *not* want to activate Screen Saver if you will use:

- a mouse and will not be using the keyboard for some time.
- software that causes the screen to "shut off" even when you are using the keyboard. (See ***"When Software Does Not Work With Screen Saver"*** for more information.)

You may want to alter the Timeout Value -- the length of time elapsed before Screen Saver "shuts off" your screen display -- if you use software that combines the use of a pointing device and the keyboard.

You can make adjustments to Screen Saver:

- with the VGA Utility Program.
- by entering a command at the DOS prompt or from within a batch file.

☞ The VGA Adapter Screen Saver feature is designed exclusively for use with the VGA Adapter. It will only work when your video output is directed through the VGA Adapter. If you have a co-resident adapter and have directed the video output through that board, the VGA Adapter Screen Saver feature will have no effect.

Adjusting Screen Saver with the VGA Utility Program

Step 1 Insert the VGA Adapter Utility Diskette in Drive A (or make the Drive with VGA.COM the current Drive/directory).

Step 2 At the DOS prompt, type:

```
VGA [ENTER]
```

Step 3 Choose *"Set Screen Saver Options"* from the VGA Utility Program menu.

Step 4 Choose the option you want when this menu appears:

```
Screen Saver Options:

1.  Turn Screen Saver ON

2.  Turn Screen Saver OFF

3.  Set Timeout Value

Enter option number:
```

Step 5 Follow the instructions on the screen to return to the menu.

Adjusting Screen Saver from the DOS Prompt

These are the Screen Saver commands and their functions:

VGA SAVE:ON	Enables Screen Saver feature -- turns off the screen when there has been no keyboard activity for 5 minutes.
VGA SAVE:(n)	Enables you to change the number of minutes before Screen Saver turns off the display. The letter "n" represents the number of minutes.
VGA SAVE:OFF	Disables Screen Saver
VGA NOSAVE	Disables Screen Saver

Step 1 Copy the file "VGA.COM" from the VGA Adapter Utility Diskette into a directory on your hard disk.

✓ Include the directory in the search path if you place VGA.COM in other than your root directory.

Step 2 At the DOS prompt:

- ❑ to enable the Screen Saver feature, type:

```
VGA SAVE:ON [ENTER]
```

- ❑ to change the number of minutes before Screen Saver turns off the display, type the following command substituting the number of minutes you want for the letter "n":

```
VGA SAVE:"n" [ENTER]
```

- ❑ to disable Screen Saver, type:

```
VGA SAVE:OFF [ENTER]

        or

VGA NOSAVE [ENTER]
```

When Software Does Not Work With Screen Saver

The VGA Adapter Screen Saver feature will not work correctly with software that doesn't pass on your keystrokes properly. You will know this is a problem if:

- ❑ The screen goes blank while you are using the keyboard.
- ❑ Striking a key does not return an image to your screen after it has gone blank.

If either of these symptoms occur, try:

- ❑ Restoring the screen by hitting the NUMLOCK key.
- ❑ Exiting your program "blind" by using the normal sequence. This allows you to save the work you have done and return to DOS.
- ❑ Rebooting your machine.

After regaining the screen via one of the above options, disable Screen Saver and resume using your program.

Important Points

☞ To deactivate Screen Saver once it is activated during boot up by your AUTOEXEC.BAT, type:

```
VGA SAVE:OFF
```

☞ To change your setup so that Screen Saver will not be automatically enabled during startup, delete "VGA SAVE:ON" from your AUTOEXEC.BAT file and reboot your system.

☞ To automatically disable Screen Saver whenever you use a program that doesn't work with Screen Saver, use a batch file to invoke the program and include *one* of the following:

```
VGA SAVE:OFF   or   VGA NOSAVE
```

EMULATION MODES

Feature Description

The VGA Emulation Modes are needed for programs that make direct access to the Color Graphics Adapter (CGA) or Hercules Graphics Card (HGC) registers (or ports). You should run your program first, without using the VGA Emulation Modes. An Emulation Mode may be necessary if:

- a program that works with a CGA or HGC fails to work properly on the VGA Adapter.
- a program's documentation specifically states that the program needs a CGA or HGC.

With the exception of HGC compatible software, most programs written since the introduction of EGA do not require the Emulation Modes because they do not make direct access to the CGA registers.

You can enable or disable Emulation Modes:

- with the VGA Utility Menu program.
- by entering a command at the DOS prompt or from within a batch file.

About Monochrome Emulation

The Monochrome Mode allows you to configure the VGA Adapter to emulate the Hercules Graphics Card (HGC).

The HGC has 64K of video graphics memory. Your VGA Adapter can run software written to utilize the graphics capabilities of the Hercules Graphics Card in two ways:

- FULL mode, configured to use the full amount of memory (two graphics pages, or 64K).
- HALF mode, configured to use half that amount (one graphics page of memory, or 32K).

The advantage of HALF mode is that it allows an IBM compatible CGA card to co-exist with the VGA Adapter (in Hercules compatible mode) in another slot. Color output is directed through the co-resident CGA.

About 100% VGA Compatibility

The VGA Adapter offers extension registers beyond the IBM VGA's standard. Some operating environments are sensitive to the use of these extension registers. In order to prevent the VGA Adapter from accessing any extension registers, type:

```
VGA PURE:ON [ENTER]
```

This also prevents the VGA Adapter from accessing its extended modes. To enable access to these modes (even if Switch 8 is ON), type:

```
VGA PURE:OFF [ENTER]
```

Enabling/Disabling Emulation Modes with the VGA Utility Program

Step 1 Insert the VGA Adapter Utility Diskette in Drive A (or make the Drive with VGA.COM the current Drive/directory).

Step 2 At the DOS prompt, type:

```
VGA [ENTER]
```

Step 3 Choose *"Select Emulation Mode"* from the VGA Utility Program menu.

Step 4 Choose the option you want when this menu appears:

```
Emulation Mode Options:


1. Color Display Options

2. Monochrome Display Options


Enter option number:
```

Step 5 Follow the instructions on the screen to complete the procedure and to return to the menu.

Enabling/Disabling Emulation Modes from the DOS Prompt

These are the Emulation Mode commands and their functions:

VGA CGA:ON	Configures the VGA Adapter to emulate the CGA.
VGA CGA:OFF	Deactivates CGA Emulation.
VGA MONO:ON	Configures the VGA Adapter to emulate HGC with 64K of memory. This is the same as VGA MONO:FULL.
VGA MONO:OFF	Deactivates HGC emulation.
VGA MONO:FULL	Configures the VGA Adapter to emulate HGC and use 64K (two graphics pages) of memory. *The VGA Adapter cannot have a CGA co-resident.*
VGA MONO:HALF	Configures the VGA Adapter to emulate HGC and use only 32K (one graphics page). *Use this configuration if you have a co-resident CGA in your system.*

Step 1 Copy the file "VGA.COM" from the VGA Adapter Utility Diskette into a directory on your hard disk.

✓ Include the directory in the search path if you place VGA.COM in other than your root directory.

Step 2 At the DOS prompt:

- ❑ to enable CGA Emulation; configure your VGA Adapter to emulate the IBM CGA, type:

  ```
  VGA CGA:ON [ENTER]
  ```

- ❑ to deactivate CGA Emulation, type:

  ```
  VGA CGA:OFF [ENTER]
  ```

- ❑ to enable HGC Emulation; configure your VGA Adapter to emulate the Hercules Graphics Card, type:

  ```
  VGA MONO:ON [ENTER]
  ```

- ❑ to deactivate HGC Emulation, type:

  ```
  VGA MONO:OFF [ENTER]
  ```

- ❑ to enable HGC Emulation -- FULL; configure your VGA Adapter to emulate HGC and use the full 64K (two graphics pages) of memory, type:

  ```
  VGA MONO:FULL [ENTER]
  ```

- ❑ to enable HGC Emulation -- HALF; configure your VGA Adapter to emulate HGC and use only 32K (one graphics page) type:

  ```
  VGA MONO:HALF [ENTER]
  ```

SWITCH MONITOR TYPE

Feature Description

Your VGA Adapter is equipped to work with both color and monochrome analog monitors. While any mode can be run on either kind of monitor, it is necessary to match the monitor type with the emulation mode desired. For example, in order to emulate HGC on a color monitor, you must first switch the monitor type to monochrome. Similarly, in order to emulate CGA on a monochrome monitor, you must first switch the monitor type to color.

You can change the monitor configuration:

- ❑ with the VGA Utility Menu program.
- ❑ by entering a command at the DOS prompt or from within a batch file.

MULTIPLE VGA COMMANDS

VGA commands can be combined on one line (up to 80 characters). You can save time by combining commands. For example:

If you want to configure your VGA Adapter to emulate CGA and, at the same time, set the SAVE feature for a 15 minute delay, you would type:

```
VGA CGA:ON SAVE:15 [Enter]
```

BACKWARDS COMPATIBILITY

Feature Description

The VGA Adapter will run most programs written for any of the popular IBM graphics standards: EGA, CGA, and HGC.

EGA Compatibility

The VGA Adapter is fully BIOS compatible with the EGA. Because the EGA and the VGA are very closely related at the hardware level, BIOS-level compatibility enables virtually all EGA software to run without problems. Should you experience difficulties, you should contact the software manufacturer to see if their software package requires an update to work properly on a VGA.

CGA Compatibility

In order to run CGA-specific programs, CGA emulation must be turned on with the VGA.COM program. (See page 13.) You will know that you are in emulation mode because the VGA Adapter uses a different text font when emulating CGA. Running a program which accesses a mode not available on the CGA will automatically switch you back into VGA mode. Before running another CGA program, you must again use the VGA utility program to re-enable CGA emulation.

HGC Compatibility

While in HGC emulation, the VGA Adapter will automatically switch into VGA mode if a mode is accessed which is not available on the HGC. Before running another Hercules program, you must again use the VGA utility program to re-enable HGC emulation.

VGAANSI.SYS

The DOS ANSI.SYS device driver will only work with standard text modes (40 x 25 and 80 x 25). Your VGA Adapter Utility Diskette includes a VGAANSI.SYS device driver that provides support for standard modes as well as all VGA Adapter extended text modes.

Using VGAANSI.SYS

❇ If your CONFIG.SYS file includes the command:

```
DEVICE=[directory]ANSI.SYS
```

you must remove it when adding VGAANSI.SYS.

To use VGAANSI.SYS; allow use of all VGA Adapter modes:

Step 1 Copy the file "VGAANSI.SYS" from the VGA Adapter Utility Diskette into the root directory on your hard disk.

Step 2 Create/modify your CONFIG.SYS file by adding the following to the file:

```
DEVICE=C:\VGAANSI.SYS
```

✓ Refer to your DOS Manual if you need instructions for creating/editing a CONFIG.SYS file.

Step 3 Reboot your computer for the change to take effect.

DIRECTORY LIST UTILITY

The VGA Directory Listing Utility takes advantage of the entire screen. This utility can be used in any mode and displays directory information in as many columns as can be accommodated on the screen.

Step 1 Copy the file "DU.COM" from the VGA Adapter Utility Diskette into a directory on your hard disk.

✓ You may wish to include the directory in the search path if you place DU.COM in other than your root directory.

Step 2 At the DOS prompt, to get a list of all files in the current directory, type:

```
DU [ENTER]
```

You can:

- use [Esc] to stop the resulting display.
- pause the display by pressing any key except [Esc].
- specify multiple search strings on the command line. For example:

```
DU *.exe *.com [ENTER]
```

- display only sub-directories by using the option **/d** on the command line like this:

```
DU /d [ENTER]
```

- display the contents of a sub-directory by using wildcards after the sub-directory name. For example, for the contents of \MYFILE, type:

```
DU \MYFILE/*.* [ENTER]
```

- include hidden files with the display of a directory's contents by using the option **/h** on the command line. Include a space before typing "/h" like this:

```
DU /h [ENTER]
```

- include system files with the display of a directory's contents by using the option **/s** on the command line. Include a space before typing "/s" like this:

```
DU /s [ENTER]
```

ENHANCED MODE CLEAR SCREEN UTILITY

To clear the entire screen in any text mode, type:

```
CLR [ENTER]
```

SETTING TEXT MODES

The VGA Adapter Utility Diskette includes a program called *Enhancement Selection Utility (ESU)* that allows you to change text modes very easily. You can set a text mode by using the menu driven feature of ESU or by entering commands at the DOS prompt.

Setting Text Modes with the ESU Menu

Step 1 Insert the VGA Adapter Utility Diskette in Drive A (or make the Drive with ESU.COM the current Drive/directory).

Step 2 At the DOS prompt, type:

```
ESU [ENTER]
```

Step 3 Choose the type of monitor you are using from the list presented.

✻ *DO NOT choose Variable Frequency Monitor unless you are using one of these monitors. Setting up to use the modes available with these monitors can cause damage to a system using other monitors.*

Step 4 A list of text modes available for the monitor you choose will appear. Choose the text mode you want.

Setting Text Modes from the DOS Prompt

Step 1 Copy the file "ESU.COM" from the VGA Adapter Utility Diskette into a directory on your hard disk.

Step 2 At the DOS prompt, type:

```
ESU /[mode number from below] [ENTER]
```

List of Text and Graphics Mode Numbers

☞ This list can also be accessed through DOS by typing:

```
ESU /? [ENTER]
```

Mode	Resolution	Colors	Monitors	Type
40	80 x 43	16	VFD, AD	Text
43	80 x 60	16	VFD, AD	Text
44	100 x 60	16	VFD, AD	Text
60	752 x 410	16	VFD, AD	Graphics
61	720 x 540	16	VFD	Graphics
62	800 x 600	16	VFD	Graphics
66	640 x 400	256	VFD	Graphics

Monitors: AD - Analog Display
VFD - Variable Frequency Display

DIAGNOSTICS PROGRAM

The Diagnostics Program on the VGA Adapter Utility Diskette will help you spot problems that may occur with your display adapter. The program is run from the DOS prompt by typing:

```
VGADIAG [ENTER]
```

First, the Diagnostics program will display:

- The amount of video memory available on your VGA Adapter. This should be 256kB.
- Primary and secondary graphics adapters.
- Monitor configurations.
- Motherboard ROM Date.
- the VGA Adapter BIOS Date/Version.
- Switch Settings.

If the information shown is incorrect, refer to Appendix C - Troubleshooting Your VGA Adapter Installation. Then run the Diagnostics program again.

If the information shown is correct, continue with the program. You will be shown a series of self-explanatory screens demonstrating various attributes and capabilities of the VGA Adapter.

If the Diagnostics program indicates a problem, refer to Appendix C - Troubleshooting Your VGA Adapter Installation. Run the Diagnostics program again.

PART 3: APPLICATION SOFTWARE

INTRODUCTION

The capabilities of the VGA Adapter go beyond the VGA standard. Your new VGA Adapter can:

- ❑ drive a variable frequency display in an extended graphics mode with 800 x 600 dot resolution and 16 simultaneous colors.

- ❑ display 256 color graphics in 640 x 400 dot resolution on any supported monitor.

To take full advantage of these enhancements, your VGA Adapter is packaged with software support for several popular software programs. This section describes the procedures necessary to configure these programs and/or install special drivers to give you the best performance from your software.

The applications programs described are:

- ❑ AutoCAD and AutoShade
- ❑ Lotus 1-2-3 and Symphony
- ❑ Windows 2.0x
  (*All* applications that run under Windows will take full advantage of your VGA Adapter.)

Before You Begin

✻ *To avoid damage* to your monitor and other parts of your computer system, be sure you have correctly installed the VGA Adapter before you attempt to configure the software as described in this section.

☞ The VGA Adapter's extended 800 x 600 graphics resolution requires a variable frequency monitor such as the NEC MultiSync, Sony MultiScan, or Tatung Omniscan.

Graphics resolutions beyond 640 x 480 are not supported on the IBM PS/2 8503, 8512, 8513, or 8514 monitors or compatible displays.

☞ You may have to adjust the horizontal and vertical size and position controls when using extended resolution modes.

AutoCAD

The AutoCAD drivers enable AutoCAD users to use the VGA Adapter to produce high resolution graphics. There are two drivers provided on the VGA Adapter Utility Diskette. VGAREL9.COM and VGAADI2.COM are for AutoCAD Release 9 and AutoCAD version 2.18 or above. The VGAREL9.COM driver supports the new ADI version 3 and above interface. It supports Fast Vector mode and Packet modes of the version 3 ADI interface. The VGAREL9.COM AutoCAD driver also supports AutoShade and AutoSketch.

The instructions which follow assume that you have copied the files VGAREL9.COM, VGAADI2.COM, and VGAINST.COM to your hard disk. The following instructions refer explicitly to the VGAREL9.COM driver. The operation of the VGAADI2.COM driver is identical to VGAREL9.COM and the same instructions should be followed for both.

AutoCAD Release 9 Installation

The Release 9 AutoCAD ADI driver comes with one AutoCAD display driver and an installation program. The installation program allows you to change the currently selected resolution of AutoCAD's graphics screen, as well as modify the software interrupt vector used by AutoCAD to communicate with the ADI display driver, and finally to modify the colors used in several areas of the AutoCAD graphics screen.

Before you can begin working with AutoCAD you must load the ADI driver into your computer's memory. This procedure must be done, every time you turn your computer on, or when you perform a warm boot. It is therefore suggested that the command to load the ADI driver be placed in your AUTOEXEC.BAT file.

To install the ADI driver, type:

```
VGAREL9 [ENTER]
```

This command will load the ADI driver into the computer's memory. The driver will then display identification information on the screen, and confirm that it has been installed. The driver will also notify you as to which interrupt vector will be used to communicate with AutoCAD.

AutoCAD ADI Configuration

AutoCAD need only be configured for the ADI General Display Driver once. Even if you turn off your computer or reboot it, AutoCAD will remember that the ADI General Display Driver has been installed. Follow the procedure outlined below to configure AutoCAD:

Step 1 Start AutoCAD as described in the documentation supplied with that program.

Step 2 When AutoCAD's Main Menu appears, select: "Configure AutoCAD."

This will be done automatically if AutoCAD senses that it has not yet been configured. If you have not copied the AutoCAD device driver files, AutoCAD will ask you where the display device drivers can be found. Place the VGA Adapter Utility Diskette with the AutoCAD drivers into drive A and respond by typing:

```
A: [ENTER]
```

Step 3 After reviewing you current configuration, press the `[ENTER]` key.

Step 4 Select: "Configure Video Display."

Step 5 Enter: `Y` (select different video display)

Step 6 Enter: `1` (chooses ADI)

Step 7 AutoCAD will ask you a series of questions, press the `[ENTER]` key for each choice. Consult the AutoCAD Installation & Performance Guide for more details on these options.

Step 8 Enter: `Y` (to save configuration)

AutoShade ADI Configuration

The following AutoShade instructions are applicable to the VGAREL9.COM driver only. When AutoShade is first run it will request some information from you in order to properly configure itself.

When AutoShade requests the selection of the Display Device simply respond with a "1" (AutoDesk Device Interface rendering driver). The interrupt vector initially used should be "7ah" and should correspond to the interrupt vector to which the ADI driver has been configured.

When AutoShade requests you to select the Rendering Display Device, again enter "1" (AutoDesk Device Interface rendering driver). Use the default "7ah" interrupt driver as outlined above. Respond to the question "Do display and rendering devices share a single screen?" with "YES."

Controlling Resolution and Colors

The VGA Adapter AutoCAD ADI driver allows you to choose different screen resolutions, colors, and interrupt vectors through the use of the Install Program (VGAINST.COM).

Step 1 At the DOS prompt, type:

```
VGAINST [ENTER]
```

This command will run the VGA Adapter install program. The install program should respond by putting an introductory message on the computer screen. The install program will prompt you for several responses.

Step 2 Enter name of driver to be modified (VGAREL9.COM):

The text contained between the brackets will be the default response. To accept the default response simply press the [ENTER] key. The name of the driver is required because the install program will modify both the memory resident version of the ADI driver and the file on your hard disk. This way any changes you make now will be remembered for all future sessions with AutoCAD. You may wish to create several different versions of the driver to support different resolutions or colors. To do this simply copy the supplied driver to a file with a different name and then modify it to the desired settings.

Step 3 You will then be prompted for an interrupt vector number. The only reason you will ever want to modify this interrupt vector is if the default value conflicts with some other software you might have

in your system. The supplied default will work correctly under most circumstances.

Step 4 You will see:

```
Resolution Data
Current Resolution is (640 x 480)
Available Resolutions are:
    1:  640 x 480 by 16 colors
    2:  752 x 410 by 16 colors
    3:  640 x 350 by 16 colors
    4:  720 x 540 by 16 colors
    5:  800 x 600 by 16 colors

Enter desired resolution [0=current]:
```

☞ The list of available resolutions may change as higher resolutions and more colors are supported within the driver.

Step 5 The following three choices are for experienced AutoCAD users. We suggest that you use the defaults.

```
Configuration Data
Enter desired number of Status Lines [1]:
Enter desired number of Screen Menu
   Characters [8]:
Enter desired number of Command Prompt
   Lines [3]:
```

Step 6 Supply the screen colors as requested. This chart shows the numbers and the colors available:

Number	Color
0	black
1	red
2	yellow
3	green
4	cyan
5	blue
6	magenta
7	white

For the Graphics Area Background color of the drawing area, you may select either a dark (black) or a light graphics area background. If you select a light graphics area background, then lines drawn in color 7 will be drawn in black instead. This choice most closely resembles a black ink drawing on paper. Graphics area and text area background colors are applicable only to the VGAREL9.COM driver.

Some of the colors you will be selecting will not correspond to the table listed above. This is because the color you are selecting will be XOR'd with the color it is overlaying. In particular this is true of the XOR color, the Menu Highlight color, the grid dot color, and the cursor color. With some experimentation you will be able to control these colors easily and selection will not be too difficult.

It is possible to change the screen colors while you are in AutoCAD. Use the AutoCAD SHELL command and run VGAINST.COM and then type "EXIT" to return to AutoCAD.

LOTUS 1-2-3 AND SYMPHONY

☞ Lotus drivers included on your VGA Adapter Utility Diskette require Lotus 1-2-3 Version 2.0 or later or Symphony.

Step 1 Make a backup copy of the 1-2-3 or Symphony Utility diskette. Use the backup diskette throughout these steps.

Step 2 Copy the following files from the VGA Adapter Utility Diskette to the 1-2-3 or Symphony backup Utility diskette:

GD640V20.DRV
GD752V20.DRV
GD800V20.DRV
VD80X60.DRV
VD100X60.DRV

Step 3 Place the 1-2-3 or Symphony Utility diskette in Drive A and type:

```
INSTALL [Enter]
```

Step 4 Follow screen directions to **MAIN MENU**. Select:

```
ADVANCED OPTIONS [Enter]
```

Then select:

```
ADD NEW DRIVERS TO LIBRARY [Enter]
```

Follow directions to add drivers.

Step 5 Return to the **ADVANCED OPTIONS** menu. Select:

```
MODIFY CURRENT DRIVER SET [Enter]
```

Then select:

```
GRAPHICS DISPLAY [Enter]
```

The display will list all drivers available. Select the driver you wish to install.

Step 6 Select:

```
SAVE CHANGES [Enter]
```

Follow the instructions to name the new driver set or make it the default driver set.

Step 7 After changes have been saved, follow instructions to exit the INSTALL program.

WINDOWS 2.0x

Step 1 Place Microsoft Windows Setup diskette in Drive A and type:

```
SETUP [ENTER]
```

Step 2 Run Setup Program as described in the Microsoft Windows documentation.

Step 3 When asked for type of display adapter, choose "other" and place the VGA Adapter Utility Diskette in Drive A.

Step 4 Follow directions provided on your screen.

APPENDIX A:

TWO MONITOR SYSTEMS

You have the option of using another video adapter and monitor in conjunction with the VGA Adapter and associated monitor. The VGA Adapter will only work with certain combinations of an additional video card/monitor.

✻ DO NOT use any EGA or VGA card as a second adapter when using the VGA Adapter

You may use either a monochrome display adapter (MDA) or a Hercules Graphics Adapter (HGA) with a monochrome monitor. You may also use a Color Graphic Adapter (CGA) with either a RGB or EGA color monitor.

☞ **The capability of your VGA Adapter and Primary Display is altered by the type of second display adapter/monitor combination.**

All Display Adapters use a portion of a computer's memory for color and monochrome attributes. The simple concept to remember is that *in your computer's memory, you cannot have two things occupying the same space*:

- ❑ If your second display adapter/monitor combination is color, then the color capability of your VGA Adapter/monitor will not be available.
- ❑ If your second display adapter/monitor combination is monochrome, then the monochrome capability of your VGA Adapter/monitor will not be available.

APPENDIX B:

TECHNICAL INFORMATION

Connector Pinouts

Video port connector pinout:

Pin	Function
1	Red Video
2	Green Video
3	Blue Video
4	Monitor ID Bit 2
5	not used
6	Red Return (ground)
7	Green Return (ground)
8	Blue Return (ground)
9	Key (no pin)
10	Sync Return (ground)
11	Monitor ID Bit 0
12	Monitor ID Bit 1
13	Horizontal Sync
14	Vertical Sync
15	not used

Programmer's Information

The VGA Adapter supports all the standard graphics and text modes and several proprietary extended modes:

Mode	Resolution	Colors	Monitors Supported
40	80x43	16	Variable Frequency and Analog Display
43	80x60	16	Variable Frequency and Analog Display
44	100x60	16	Variable Frequency and Analog Display
60	752x410	16	Variable Frequency and Analog Display
61	720x540	16	Variable Frequency
66	640x400	256	Variable Frequency

The interface to these modes is:

Input
AH = 6Fh
AL = 05h
BL = MODE NUMBER (see list above)

☞ The following books may be of further assistance for programming:

EGA/VGA - A Programmers Reference Guide,
Bradley Kliewer
Intertext Publications
McGraw-Hill Book Company
11 W. 19th, New York, NY 10011
Copyright 1988

Programmer's Guide to PC and PS/2 Video Systems,
Richard Wilton
Microsoft Press
16011 N.E. 36th Way, Box 97017
Redmond, WA 98073
Copyright 1987

APPENDIX C:

TROUBLESHOOTING

THE VGA ADAPTER INSTALLATION

Step 1 Make sure the VGA Adapter is firmly seated in its expansion slot, and that it is not touching other boards in your system.

Step 2 Check the monitor cable to insure that it is properly connected to the VGA Adapter, and that it has the proper "pinout" configuration.

Step 3 Make sure your computer is an IBM PC XT, PC/AT, or a PS/2 Model 30, or 100% compatible.

Step 4 If an IBM PC, check that your ROM BIOS module is up to date. See "VGA Adapter Compatibility With Your Computer" section in this manual for information on how to find out the date of the ROM BIOS module installed in your system.

Step 5 Check your computer's switch and jumper settings, and those on the VGA Adapter to insure that all settings are correct for your computer system.

Step 6 Check your software. The VGA Adapter can emulate five different display adapters. Be sure you are using the correct software configuration.

Step 7 Check your monitor. The VGA Adapter can work with a number of different monitor types. Be sure you have the VGA Adapter configured for the monitor you are using.

Commonly asked questions about monitors:

Q. ***Why does the picture shift when changing modes on my multiple frequency monitor with my VGA Adapter?***

A. Some multiple frequency monitors don't synchronize properly to the signals coming from the graphics board, so the image seems to shift. *To rectify this situation, simply adjust the horizontal and vertical positions to center the image.*

Q. ***Why does the image take a few moments to "settle" on the screen when changing modes or when first turned on?***

A. It is normal for any monitor to "warm-up" for at least 30 minutes before producing a completely stable image. If the monitor has been on for longer than 30 minutes and still produces a "shaky" image that doesn't settle for a few moments, the reason is that the monitor is not synchronizing properly to the signals coming from the graphics board. (See the question/answer above.)

Step 8 Make sure you are using the correct VGA.COM commands when in HGC or CGA compatibility modes.

Step 9 Run the VGA Adapter Diagnostics Program.

WARRANTY PROVISIONS

TATUNG warrants to the original purchaser that this product is in good working condition for a period of one year from date of purchase. Should this product, in TATUNG's opinion, malfunction within the warranty period, TATUNG will repair or replace this product without charge as defined by this warranty. Replacement of either the card or parts there-on will be only on an exchange basis. Any replaced parts become the property of TATUNG. This warranty does not apply to those products which have been damaged due to accident, abuse, improper installation, natural or personal disaster or unauthorized alterations, repairs or modifications.

WARRANTY LIMITATIONS

All warranties for this product, expressed or implied, are limited to one year from the date of purchase and no warranties, expressed or implied, will apply after that period.

If this product does not perform as warranted herein, the owner's sole remedy shall be the repair or replacement as provided for above. In no event will TATUNG be liable to any purchaser for lost revenue, lost wages, lost savings or any other incidental or consequent damages arising from the purchase, use or inability to use this product, even if TATUNG has been advised of the possibility of such damages.

This limited warranty applies to hardware products only.

WARRANTY SERVICE

Before returning any product for warranty service be sure to check the troubleshooting and diagnostics section in Appendix C.

Any boards returned directly to TATUNG must have a copy of proof of purchase (including date of purchase), a note which outlines the problem and includes relevant information such as PC used, monitor used, other display cards installed, etc. The customer agrees to accept liability for damage or loss to the product, to prepay all shipping charges and to use packing material similar to the original packing used. The factory service center is located at 2850 El Presidio Street, Long Beach, CA 90810.

SOFTWARE COMPATIBILITY GUARANTEE

During the one year parts and labor warranty period, if any software fails to run on an IBM PC/XT or AT system with the TATUNG VGA card, but will run on the same configuration with the IBM PS/2 Display Adapter, Tatung Company of America, Inc. will resolve the problem within 30 days. Otherwise, Tatung Company of America, Inc. will refund the purchase price for the card.

TECHNICAL SUPPORT

If it is necessary to contact us regarding installation, try to isolate the problem using the diagnostics suggestions in Appendix C and have the following information ready.

1) The brand and model of the PC.
2) The brand and model of the monitor.
3) All other adapter cards installed.
4) Current TATUNG VGA and PC motherboard switch settings.
5) DOS version and names of resident software in use.
6) A description of the image displayed on the monitor.

To contact us, call our Technical Support Department at (213) 979-7055 and ask for extension 216.

TATUNG COMPANY OF AMERICA, INC.
Long Beach, CA / Arlington, TX / Jamesburg, NJ